

Committee on Resources

Witness Testimony

**Testimony of Dr. Mark S. Boyce,
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before the
Subcommittee on National Parks and Public Lands
Committee on Resources
U.S. House of Representatives**

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The Importance of Science for Sound Management in National Parks

Mr. Chairman and members of the Subcommittee, I am honored to have the opportunity to present my thoughts on the importance of science in shaping management decisions in our national parks. My name is Mark S. Boyce. I hold the position of Vallier Chair of Ecology and Wisconsin Distinguished Professor in the College of Natural Resources at the University of Wisconsin-Stevens Point in the largest undergraduate wildlife program in the United States. I am currently editor-in-chief for the *Journal of Wildlife Management* which is The Wildlife Society's research periodical. During 1989-1993 I was Director of the University of Wyoming-National Park Service Research Center where I was responsible for managing a peer-reviewed competitive research contracts program for the National Park Service.

I have published about 150 scientific papers and six books including *Ecosystem Management: Applications for Sustainable Forest and Wildlife Resources* (1997, Yale University Press), *The Greater Yellowstone Ecosystem: Redefining America's Wilderness Heritage* (1991, Yale University Press), and *The Jackson Elk Herd: Intensive Wildlife Management in North America* (1989, Cambridge University Press). I have conducted research in the Greater Yellowstone Ecosystem (GYE) since 1977 when I began studies on elk populations. My subsequent studies in the GYE have involved bison, grizzly bears, and wolf recovery.

I wish to speak in favor of a renewed science initiative for our national parks. I believe that scientifically gained knowledge is fundamental to sound management in our parks, and I believe that the scientific research conducted in our parks has greatly benefited their management. Science is the basis for ecosystem management, a new discipline of applied ecology that attempts a comprehensive approach to natural resource management. Ecosystems are exceedingly complex, and we do not know how to manage ecosystems well. National parks afford a key link in the development of sound ecosystem management by serving as ecological baselines, i.e., controls. Only with such baseline areas can we have a basis for evaluating environmental change in other areas.

Controversy continues over the link that should exist between science and management. On one extreme, sound scientific information might not be obtained when all researchers are in the Park Superintendent's hip pocket, i.e., at the disposal of management for solving management problems. At the other extreme, a research team that is not linked to management is likely to pursue basic research that may not meet the resource management needs for the parks. One approach to resolve such potential conflicts is to fund

contracts or grants on park-identified needs to university scientists, e.g., as facilitated by the Cooperative Park Studies Unit (CPSU) system. Or even better, NPS could support research funding that is awarded competitively to university scientists using a process of peer review such as that used by the National Science Foundation. Such a competitive peer-review process ensures that the quality of science is of utmost priority while also permitting rigorous review of funding levels.

I do not wish my comments in support of increased science in the NPS to be misconstrued as a criticism of the Biological Resources Division (BRD) of the US Geological Survey. I believe that the BRD hosts many competent scientists, and with the recent announcement that BRD will not charge overhead to parent Interior agencies, including the NPS, there are opportunities to enhance research in our national parks through BRD. The initial formation of the BRD (formerly NBS) seemed like an excellent way to reduce redundant efforts among branches of the Department of Interior, especially involving technology such as geographic information systems (GIS). Unfortunately, however, BRD has not seen sufficient funding from Congress to achieve the science needs for the parent organizations.

The role of science in park management is perhaps best illustrated with the extensive investigations that preceded the return of wolves to Yellowstone. Indeed, I wish to commend Congress and especially several current and former members of this Committee for their support of wolf recovery in Yellowstone. Restoring wolves to the Greater Yellowstone Ecosystem (GYE) has given us a full complement of native fauna and offered us a fantastic opportunity to document how a complete faunal assemblage can function. One of the purported benefits of wolf reintroduction will be the reduction of ungulate numbers, but despite the return of this keystone predator some scientists continue to argue that artificial control of ungulate populations is necessary (untenable given current knowledge). I hope that the same vision that reestablished the wolf into Yellowstone will also ensure that sufficient monitoring work is funded to fully document the consequences of wolf recovery. Further, I trust that the same vision will ensure protection of the large mammal communities in Yellowstone from recent challenges largely emerging from agricultural interests.

I see no reason that protection of Yellowstone cannot be compatible with ranching operations outside the park. And I believe that the results of scientific research conducted during the past decade give us considerable insight into how to accomplish compatible juxtaposition of agriculture and ecological baseline preserves. Indeed, developing sound ecosystem science requires that we maintain areas such as Yellowstone with minimal human intervention to be able to evaluate the consequences of human activities in adjacent areas where lands are managed to meet human needs.

The successes of grizzly bear management in the GYE offer another example of the benefits to park management from research. Demographic research by the Interagency Grizzly Bear Study Team identified mortality "sinks" where excessive bear mortality occurred. This led to the closure of a campground at Fishing Bridge and transfer of sheep grazing allotments to nonconflict areas on the Targhee National Forest in Idaho and Wyoming. Together with strict management guidelines developed by the Interagency Grizzly Bear Committee, estimates of grizzly bear abundance are currently higher than ever before recorded in the GYE.

During the past five years a large number of ecological studies conducted in Yellowstone National Park have been published in peer-reviewed journals. Research in Yellowstone was stimulated by the Congressionally mandated grazing studies beginning in the mid-1980s, resulting in several publications that questioned the traditional wisdom that Yellowstone's northern range was "overgrazed." Before the grazing studies were completed, an additional Congressional appropriation was made for fire research subsequent to the 1988 fires in Yellowstone, and most recently in the series of studies funded in anticipation of wolf

recovery. These studies have greatly increased our understanding of ecological processes in the Yellowstone ecosystem. A majority of the peer-reviewed research publications were conducted by university-based scientists and graduate students.

Part of the reason for my participation in this Subcommittee hearing is concern over the anticipated testimony from Frederick Wagner, Charles Kay, and Richard Keigley, all of whom have been exceedingly critical of NPS management in Yellowstone. Their position is a minority opinion based on the fact that the bulk of peer-reviewed scientific literature is contrary to their claims. The NPS has supported a number of dedicated scientists whom I believe have helped the Park Superintendent to make reasoned management decisions. I am also concerned by the alarmist positions that imply a need to cull ungulates within Yellowstone National Park because I believe that this would be a serious mistake.

This is not to imply that controversy does not exist among scientists about management policies for Yellowstone, but I do not believe that Wagner, Kay, and Keigley provide a balanced perspective on the role that science should take in establishing resource management policy in Yellowstone National Park. Shortly after Jerry Franklin became President of the Ecological Society of America a couple of years ago I asked him to consider organizing a professional society evaluation of science and management in Yellowstone. Franklin declined my suggestion recognizing that the issue was controversial among ecologists and he feared that the society would not reach a consensus. However, I am confident that ecologists would overwhelmingly support the need to maintain national parks as ecological baseline preserves allowing natural ecological processes to run their course.

I support the current NPS approach to management of our national parks which I have termed ecological-process management. This involves allowing ecological processes of nutrient cycling, plant succession, fire, flooding, decomposition, competition, predation, herbivory, symbiosis, dispersal, births and deaths to function with minimal intervention by humans. Maintaining the integrity of ecological processes does not imply that landscapes should match preconceived notions, nor does it imply reconstruction of some past condition. Current NPS management policy is often termed natural regulation management but I believe that natural regulation engenders semantic confusion that obscures the true intent of NPS management policy.

The source of greatest controversy over this management policy is management of bison and elk on Yellowstone's northern range. During the 1960s the best available expert opinion suggested that culling of elk and bison was necessary to maintain herd sizes at levels consistent with proper range-stocking levels for cattle. Economic criteria for establishing stocking levels for cattle had little to do with the population dynamics emerging as a consequence of plant-herbivore interactions. Herd sizes have increased substantially in recent years leading agriculture interests to call for the need to reduce herds. The motivation for these proposed culling programs are (1) perception that ungulates are "damaging" the vegetation, (2) concern by livestock growers over the risk of transmission of brucellosis to cattle from bison or elk, and (3) Charles Kay's hypothesis that native Americans were incredibly effective at killing wild ungulates so that they had little influence on vegetation prior to European settlement.

Each of these attempts to justify culling of elk within the boundaries of Yellowstone National Park is unjustified. The first perception that ungulates "damage" the vegetation is inconsistent with empirical data emerging from the northern range "overgrazing" investigations. Grasses and forbs are largely dormant underground at the time that ungulates are on the winter range, so each spring we see lush regrowth of herbaceous vegetation. Certain woody plants have indeed seen heavy browsing, especially aspen and willow. But palynological evidence (from pollen in mud cores from the bottoms of lakes) interpreted by Dr. Whitlock from the University of Oregon indicates that no major changes in vegetation composition have

occurred in recent years. Large numbers of ungulates will undoubtedly influence vegetation, as they have for hundreds and thousands of years. Dr. Whitlock's interpretation of her data is that ungulates probably have shaped vegetation communities in Yellowstone in the past as they do today. Range conditions may not be those that we would desire if we were managing livestock in Yellowstone, but such a frame of reference is irrelevant to management of a national park.

Brucellosis is a bacterial disease introduced to ungulates in Yellowstone from domestic livestock. The USDA's APHIS has an aggressive program attempting to eradicate the disease from the United States by 1998. But their target is completely unreasonable given the widespread occurrence of the disease among elk and bison in the Greater Yellowstone. Completely effective vaccines do not exist, and it is the professional opinion of epidemiologists that with current technology we cannot eradicate the disease without draconian measures such as total depopulation of bison and elk from the GYE, i.e., systematic slaughter of 120,000 elk and 1,900 bison. The issue is easily resolved by effective risk management. Transmission of the disease is unlikely to occur except during spring and early summer. Managing livestock to minimize contact with wildlife during this crucial period, and vaccinating cattle can ensure an exceedingly low probability of transmission of the disease. The problems are not with bison and elk management but rather the preposterous Uniform Methods and Rules of the USDA APHIS.

The third issue of native American overkill is an unsubstantiated hypothesis of Charles Kay in an attempt to justify culling of bison and elk in the Park. Even if his implausible hypothesis could be substantiated, it has no relevance to how we should manage ungulates in Yellowstone National Park. Understanding the history of exploitation of natural resources by humans is interesting, but it has no bearing on how we should manage resources in the future. Just because previous generations of humans decimated wildlife populations and altered natural ecosystems does not provide justification for doing so today. Humans are relatively recent in North America and time has been short enough that coevolution between humans and faunal elements is highly unlikely. Instead, by minimizing human influence we most closely approximate the ecological processes that would have occurred in the absence of human influence. Human exploitation of natural resources is without racial context, and I believe that there is value in maintaining ecological baselines with minimal human interference whether the humans are native American or of more recent immigrant ancestry.

Choosing some arbitrary time in the past to target for ungulate management is unjustified. In recent years ecologists universally have come to accept the principle that ecological processes are dynamic. Natural disturbance regimes, such as wildfire, floods, and severe winters, are fundamental to the function of places like Yellowstone. Just because a particular vegetation structure was documented in 1870 when early explorations were conducted in Yellowstone does not imply that this should constitute a target for how the vegetation should look today.

Protection and preservation of nature are what national parks are all about. We hunt elk in every western state virtually everywhere that they occur. There are few places in the United States where we can allow a population of large ungulates like elk to achieve a balance or fluctuate with their food resources and predators. Some range and wildlife managers believe that we must intervene, and somehow Nature will not get it right. Some believe that we will lose our justification for hunting if we should discover that it is not necessary to cull wildlife herds. I believe that these views are outdated and contrary to what we have learned about population ecology. I have spent my entire career studying wildlife populations attempting to understand what determines their abundance and distribution. We do not need to intervene to ensure a healthy ecosystem. Yellowstone National Park is not on the verge of ecological collapse. Indeed, to quote F. V. Hayden (1871), "Yellowstone is the greatest scientific laboratory that nature furnishes on the face of the globe."

To an ecologist, national parks are much more than recreation areas and places of scenic splendor, although we enjoy our parks for those values. But for a scientist, national parks serve an exceedingly important function as ecological baselines against which we can compare ecological processes operating in human-dominated landscapes. In addition, there is inherent interest in learning what the long-term dynamics of vegetation, ungulates, wolves and grizzly bears will be in Yellowstone. With wolf recovery, we now have reconstructed all faunal elements and have an outstanding opportunity to document the dynamics of this large mammal community. Interfering would destroy one of the grandest scale ecological experiments (albeit unduplicated) in history. We stand to gain nothing by culling ungulate populations in Yellowstone, but we would lose a great deal.

Thank you Mr. Chairman and members of the committee for the opportunity to share my views on science in the National Park Service. Good science is paramount to ensuring sound management in our national parks. But the opposite is true as well--how our parks are managed influences the ecologists' ability to do good science. Scientists need parks as controls that will form the basis for understanding what we do with the rest of the world. We should encourage the NPS to continue with its policy of managing to minimize the influence of humans on ecological process and function. I will be pleased to answer any questions.

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